This year should always memorable for Maya Gokhale of CCS-1: Her first book, "Reconfigurable Computing: Accelerating Computation with Field Programmable Gate Arrays," was published.

The 235-page book, written with co-author Paul S. Graham, was published by Springer-Verlag, a scientific publishing company with a long and respected history.

Asked about the term "reconfigurable computing," Gokhale said she was part of a research team that built one of the first two "reconfigurable computers" and "coined the term." The title of the book refers to using programmable hardware to do high-performance computation, she said.

Field programmable gate arrays (FPGAs) are integrated circuits—combining logic and memory—that can process digital information. Because they can be reprogrammed after their manufacture, they resemble microprocessors. But because they can map algorithms directly into programmable logic, they can deliver a 10-fold or 100-fold performance increase over microprocessors.

FPGAs are used in many places at Los Alamos National Laboratory. The Los Alamos Neutron Science Center (LANSCE) uses FPGAs to do data acquisition.

The International, Space and Response Division (ISR) plans to put nine FPGAs on a signal-processing satellite scheduled to be launched soon.

And in the Computer and Computational Sciences Division (CCS), Gokhale said, "We have a Cray reconfigurable computer that has six FPGAs"—one for each of its six Opteron nodes. Scientists can load different programs into the Opteron's memory and different configurations into the FPGAs.

The use of reconfigurable computing "allows you to make changes to algorithms you have previously put on the FPGA," she said, "but also to devise completely new algorithms." For that reason, it is especially useful in satellites.

Seeing the book published brought a satisfying close to a year of intense effort. Gokhale and Graham (a scientist in ISR) began work on the book in September 2004. They finished writing it in April 2005. The work related to publishing the book then took several months.

Gokhale had done chapters in books before, and she had given tutorials on reconfigurable computing, but this was her first complete book. It was actually her work gathering materials for tutorials that helped her realize that there was really no comprehensive book on the subject. She waited two years and finally decided she would have to do one herself.

"I was fortunate enough to get Paul as a co-author," she said, noting that he has a Ph.D. from Brigham Young University, where he worked very intensively on reconfigurable computing in conjunction with his doctoral research.

"In order to get a publisher," Gokhale said, "I developed a detailed outline of the book. Since I have been in the field for 15 years, I knew what the topics should be." She had hoped that she and Graham would do the computer science chapters and get contributed chapters on applications, but in the end, only two of the book's nine chapters were contributed by application experts.

She paused during the interview to give credit to Reid Porter of ISR-3, an expert on image processing; Dominique Lavenier and Mathieu Giraud of the Institut de Recherche en Informatique et Systemes Aleatoires at Rennes, France; and two papers by Los Alamos authors Christine Ahrens, Jan Frigo, Justin Tripp, Anders Hansson, Henning Mortveit, Ron Minnich, and Gokhale herself.

"Initially," she said, "I just began writing and kept going, but as time went on and things were more structured, we did set goals for ourselves." The book was sent to the publisher in early April and presented in draft form at the June 13-17 Design Automation Conference in Anaheim, California.

"Writing is very difficult," she commented—and in addition to writing the book, she said, she and Graham did all the figures, the formatting, and the layout for the attractive orange volume.

When it came time to choose a publisher, she said, "I researched all the major publishers for science." She had talked with a representative for Kluwer three years earlier at the International Conference on Computer-Aided Design, and, after surveying the publishing field, she decided that Kluwer was the publisher she wanted. She called the representative she had met, but, "It turned out that Springer had bought Kluwer," so she went with Springer.

In general, she said, the authors' relationship with the publisher went smoothly.

Asked if she is excited about the book, she said, "Yes!"

"The reason this book has come into existence and is such a comprehensive survey," she added, is because of the expertise at LANL. "I wanted to let people know that Los Alamos has this expertise."